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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/483,737	01/14/2000	Hansjorg Reichert	GR-97-P-1903	8769

7590 01/07/2004

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EXAMINER	
SEFER, AHMED N	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 01/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/483,737	REICHERT ET AL.	
	Examiner	Art Unit	
	A. Sefer	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 15* is/are pending in the application.

4a) Of the above claim(s) *1-10* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendment filed on September 30, 2003 has been entered; no new claims have been presented.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagishi et al. (JP 6-291239) in view of Komata et al (JP 2-15897), Bacon et al. US Patent No. 5,234,153 and Lin USPN 4,791,075.

Yamagishi et al disclose in fig. 1c a solder containing at least two components with at least two constituents including a first constituent containing a precious metal and a second constituent being consumed during a soldering operation by one of reacting and being dissolved in material which are to be joined; a substrate 1; and a semiconductor chip 4 secured to said substrate by one of alloying and brazing using said solder, but do not teach a hypereutectic composition of Au-Sn with a thickness.

Komata et al a precious metal and tin solder 13 and said solder has a hypereutectic concentration containing gold-tin (AuSn) with a hypereutectic Sn concentration and containing a gold-tin compound (AuSn) having a composition, which falls within the range recited in the claim.

Bacon et al. teach (see col. 1 lines 50-63 and claim 7) the advantage of using a thin gold-tin compound solder.

Lin discloses in fig. 2 a semiconductor chip 26 secured to a substrate 12 using a solder 28 to form a direct chip-substrate connection.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to replace the Au-Sn eutectic alloy of Yamagishi et al with a hypereutectic Sn concentration of Komata et al, since that would prevent deformation thereby enhancing the mechanical strength of a semiconductor chip connection to a substrate. It would have been obvious to form a layer with a thickness of 1 μm to 2 μm, since that would provide a better thermal conductance; it would have been obvious to form a direct chip-substrate connection, since that would provide a direct heat dissipation.

4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagishi et al. (JP 6-291239) in view of Ishii (JP 6-326210), Bacon et al. US Patent No. 5,234,153 and Sato et al. (JP 61-150251).

Yamagishi et al disclose in fig. 1c a solder containing at least two components with at least two constituents including a first constituent containing a precious metal and a second constituent being consumed during a soldering operation by one of reacting and being dissolved in material which are to be joined; a substrate 1; and a semiconductor chip 4 secured to said substrate by one of alloying and brazing using said solder, but do not teach a hypereutectic composition of Au-Sn with a thickness.

Ishii discloses (see fig. 2 and attached machine translated version) a semiconductor chip 1 secured to a substrate 40 by gold and tin solder 8 and said solder has a hypereutectic

concentration containing gold-tin (AuSn) with a hypereutectic Sn concentration and containing a gold-tin compound (AuSn) having a composition which falls within the range recited in the claim.

Bacon et al. teach (see col. 1 lines 50-63 and claim 7) the advantage of using a thin gold-tin compound solder.

Sato et al disclose in fig. 2 a semiconductor chip 11 secured to a substrate 1using a solder 12 to form a direct chip-substrate connection.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to replace the Au-Sn eutectic alloy of Yamagishi et al with a hypereutectic Sn concentration of Ishii, since that would prevent deformation thereby enhancing the mechanical strength of a semiconductor chip connection to a substrate. It would have been obvious to form a layer with a thickness of 1 μm to 2 μm, since that would provide a better thermal conductance; it would have been obvious to form a direct chip-substrate connection, since that would provide a direct heat dissipation.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pfeiffer et al. (EP 312 217) disclose an IC chip 11 directly secured to a semiconductor substrate 13.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (703) 605-1227.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601.

ANS
December 22, 2003.